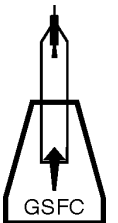


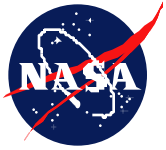


Goddard Monthly Project Status Review

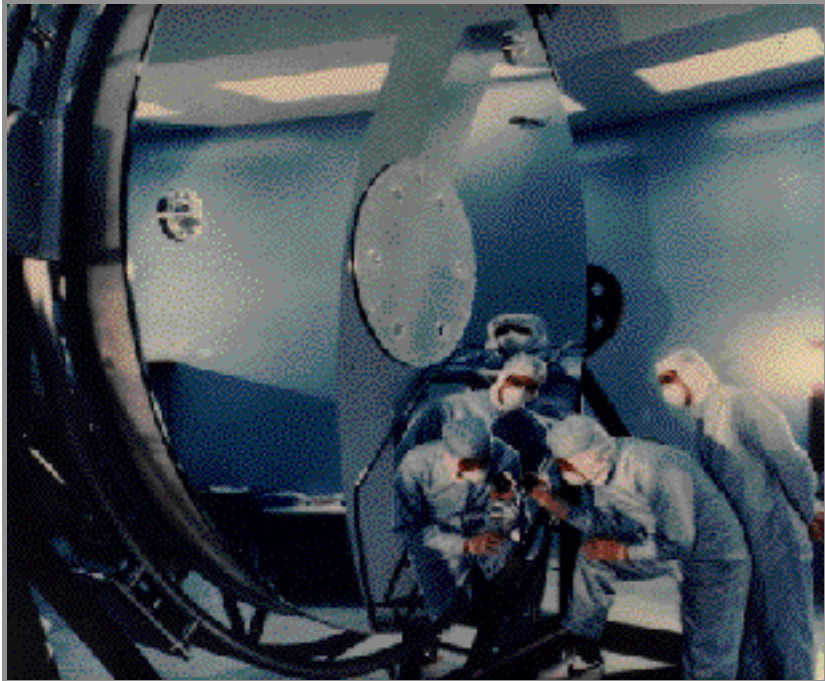
Paul Geithner

November 4, 1997

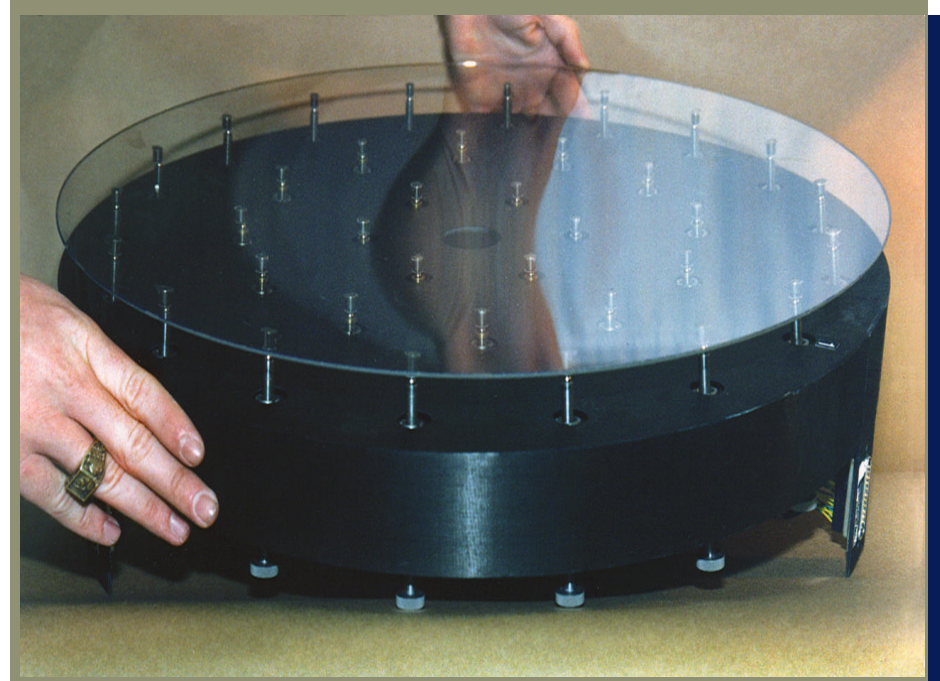




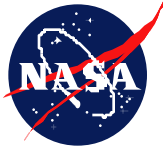
NGST is Driving the Optics Industry Paradigm Shift



HST Primary
2.4 meter-diameter glass mirror
186 kg/m²
30 cm thick



NGST Active Optic prototype
0.5 meter-diameter glass mirror
15 kg/m²
2 mm thick



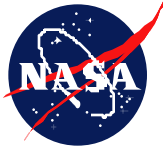
Recent Progress



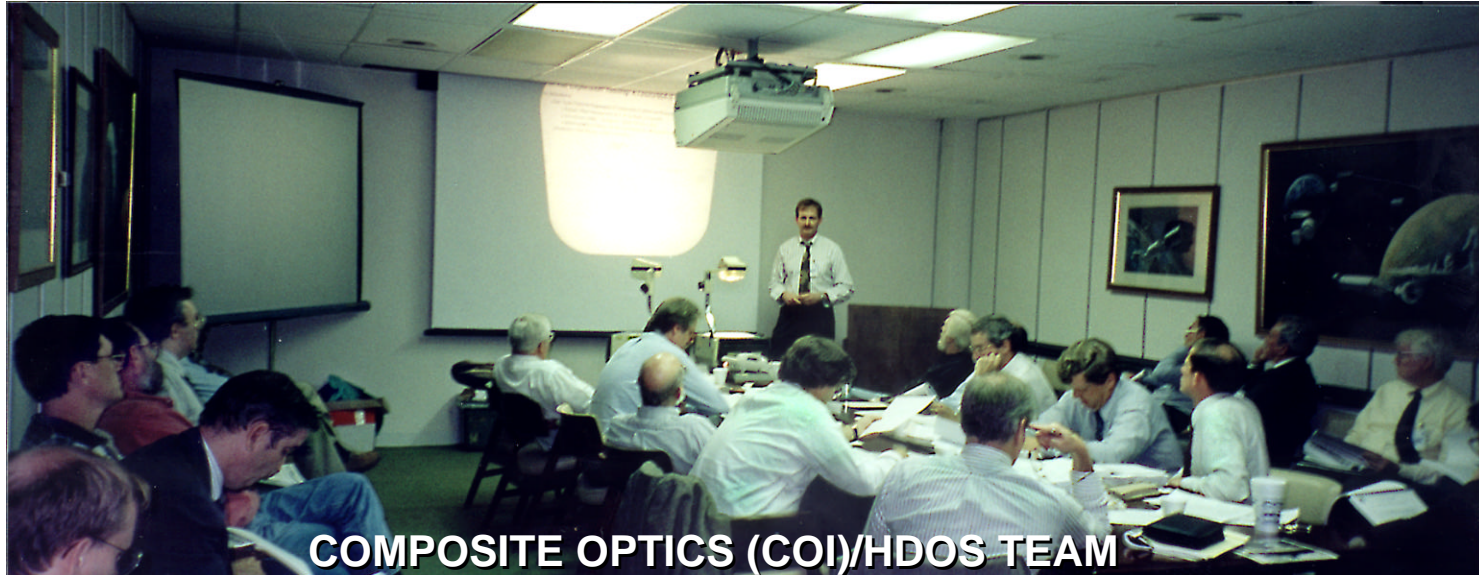
● NMSD ULTRA-LIGHTWEIGHT MIRROR PROCUREMENT - MSFC

- MIKE KRIM, THE REIGNING OPTICS PATRIARCH COMMENTED THAT “MORE HAS BEEN DONE ON THIS PROGRAM TO ADVANCE THE STATE OF THE ART IN COMPOSITE OPTICS THAN HAS BEEN DONE IN THE LAST DECADE.”
- COI/HDOS ARE INVESTIGATING A NOVEL APPROACH FOR MITIGATING THE RADIUS OF CURVATURE EFFECTS THROUGH THE INTRODUCTION OF A SINGLE ACTUATOR AT THE CENTER OF EACH SEGMENT WHICH CONVERTS LARGE AMPLITUDE, LOW SPATIAL FREQUENCY RADIUS ERRORS INTO LOWER AMPLITUDE, HIGHER SPATIAL FREQUENCY ONES WHICH CAN BE BETTER CORRECTED BY THE DEFORMABLE MIRROR
- U OF A/STEWART INDICATED THAT AN NGST WITH A FULLY ACTIVE PRIMARY, COUPLED TO A HIGH PERFORMANCE DM, CAN SPECTROSCOPICALLY ANALYZE *EARTHS* AROUND A HALF DOZEN STARS WITHIN 8 PARSECS IN THE VISIBLE
- U OF A HAS INQUIRED AS TO WHETHER THEY CAN PUT IN A UNEX PROPOSAL TO CONDUCT A 1G OFFLOAD FLIGHT TEST

BREAKTHROUGH



NGST Mirror System Demonstrator (NMSD) Program PDR 10/23/97 - 10/24/97



COMPOSITE OPTICS (COI)/HDOS TEAM



UNIVERSITY OF ARIZONA TEAM



Recent Progress (cont'd)



- **HELD THE FIRST BRIEFING BY THE NGST ARCHITECTURE STUDY INDUSTRY PARTNERS (BALL AND TRW) THE WEEK OF OCT 6 AT GSFC**
- **HELD THE FIRST MONTHLY SENIOR SCIENCE ADVISORS MEETING, CHAIRED BY ED WEILER, AT GSFC ON OCTOBER 3**
- **LETTER SENT FROM WES HUNTRESS TO DON MORTON ENCOURAGING THE CANADIANS TO EXPLORE PARTICIPATION IN NGST**
- **TWO COORDINATION/WORKING GROUP MEETINGS HELD WITH DOD/NRO IN OCTOBER; MOA'S BEING DEVELOPED WITH A GOAL OF SIGN OFF OF AT LEAST ONE BY THE END OF THIS CALENDAR YEAR**
- **RFO'S FOR COLD ACTUATOR TECHNOLOGY (LaRC) AND SCIENCE INSTRUMENT STUDIES (GSFC) RELEASED IN OCTOBER**
- **HELD THE INAUGURAL MEETING OF THE COMPETITIVELY SELECTED AD HOC SCIENCE WORKING GROUP AT THE ST Sci ON OCT 22 AND ACCEPTED THE CHARTER DRAFTED BY JOHN MATHER**

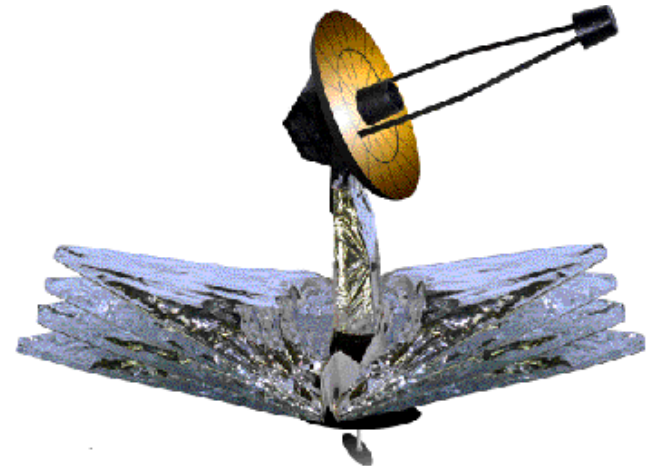


Industry Architecture Studies

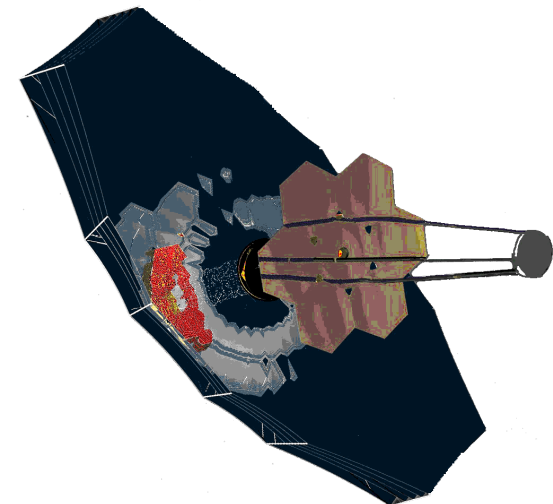


- **TRADE STUDY AND TECHNOLOGY DEVELOPMENT ROADMAP BRIEFINGS BY BALL AND TRW HELD AT GSFC ON OCT 7, 8**
 - **RESULTS OF THE \$500K “BASIC” CONTRACT**
- **GOVERNMENT TEAM AGREED TO INVOKE OPTION 1 FOR \$1M TO EACH CONTRACTOR OVER 10 MONTHS**
 - **SUGGESTED THAT BALL RETURN IN 2 MONTHS TO REDRESS SEVERAL TRADE STUDY DEFICIENCIES**
- **OPTION 2 FUNDING FOR TECHNOLOGY DEVELOPMENT BASED ON THE TECH DEVELOPMENT ROADMAP DELIVERABLE IS AS FOLLOWS:**
 - **\$2M TO TRW**
 - **\$1.5M TO BALL***

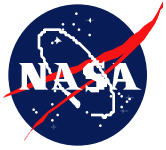
***BALL’S ROADMAP WAS DEEMED UNACCEPTABLE, AND MUST BE RE-SUBMITTED AT THE LOWER LEVEL FUNDING**



BALL CONCEPT



TRW CONCEPT

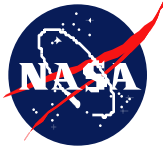


Recent Progress



- **FIRST MEETING AD HOC SCIENCE WORKING GROUP HELD 10-22-97 @ ST SCI**
 - **CO-CHAIRLED BY MATHER, STOCKMAN**
- **ELEVEN MEMBERS SELECTED COMPETITIVELY**
 - **MICHAEL FALL, ST SCI**
 - **JONATHAN GARDNER, AURA**
 - **DONALD HALL, HAWAII**
 - **ABRAHAM LOEB, HARVARD**
 - **ROBERT KIRSHNER, HARVARD**
 - **SIMON LILLY, TORONTO**
 - **BRUCE MORGAN, WA**
 - **MICHAEL MEYER, AZ**
 - **MICHAL RICH, COLUMBIA**
 - **MARCIA RICKE, AZ**
 - **MASSIMO STIAVELLI, ST SCI**
- **ASWG CHARTER APPROVED**
 - **REFINE THE PRIMARY AND SECONDARY SCIENCE GOALS**
 - **ASSIST IN PREPARING FOR EXTERNAL SCIENTIFIC ADVISORY GROUPS**
 - **REFINE THE DRM**
 - **ASSIST IN DEVELOPING SCIENCE REQUIREMENTS AND PERFORMANCE METRICS**
 - **PROVIDE SCIENTIFIC ASSESSMENTS OF DESIGN CONCEPTS AND IMPLEMENTATION**





Recent Progress (cont'd)



- **CODE 720 (MEC/AETD) CAME THOROUGH WITH CIVIL SERVANTS TO FILL KEY POSITIONS IN THERMAL AND MECHANICAL/STRUCTURAL AREAS**
- **JOHN MATHER GAVE A CENTER COLLOQUIUM ON NGST - WELL ATTENDED**
- **MARK MATSUMURA (STAAC) KICKED OFF THE IN-HOUSE INTEGRATED SCIENCE INSTRUMENT MODULE (ISIM) \$100K PHASE A STUDY**
- **HELD DISCUSSIONS WITH M. SZCZUR AND C. DUDLEY ON CIVIL SERVICE SUPPORT TO KEITH KALINOWSKI'S OPERABILITY IPT - STAFFING PROGRESSING**



Deployable, Cooled Active Telescope Testbed (DCATT)

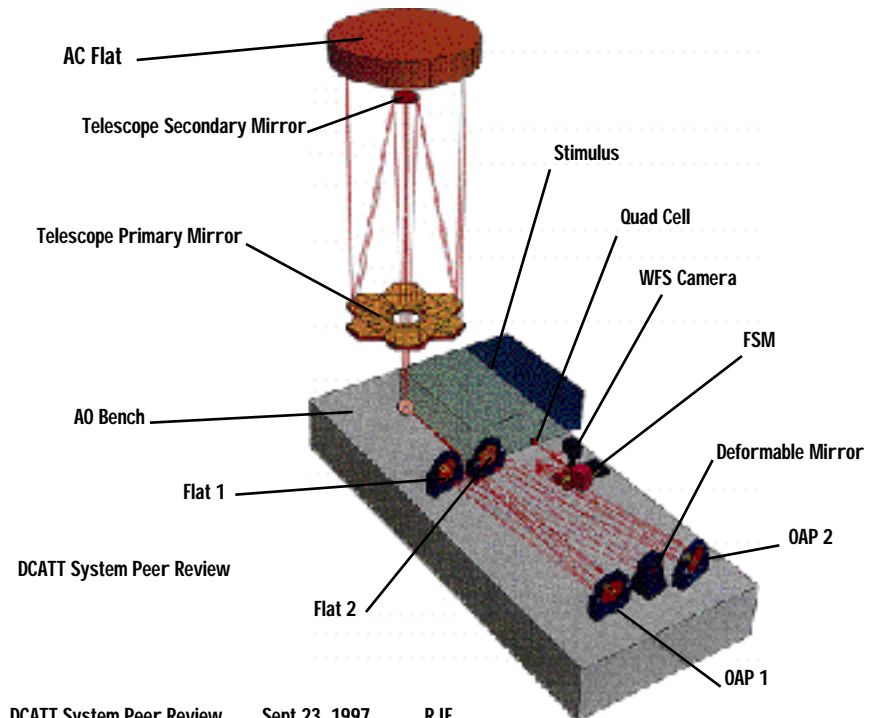


- **DCATT IS AN IN-HOUSE NGST GROUND TESTBED TO DEMONSTRATE WAVEFRONT SENSING AND CONTROL OF A SEGMENTED TELESCOPE**

- **1 METER DIAMETER, 7 PETAL PRIMARY**
- **IMAGE-BASED WAVEFRONT SENSING**
- **DEFORMABLE MIRROR**
- **DIAMOND-TURNED METAL OPTICS**
- **WAVEFRONT SIMULATOR (STIMULUS)**

- **\$10M, 3-YEAR NGST TESTBED MANAGED BY CLAUDIA LE BOEUF (AETD/MEC) WITH 15 FTE'S AT GSFC, AS WELL AS JPL AND MSFC PARTNERS**

- **TESTBED WILL BE LOCATED IN THE CIA IN BLDG 7**



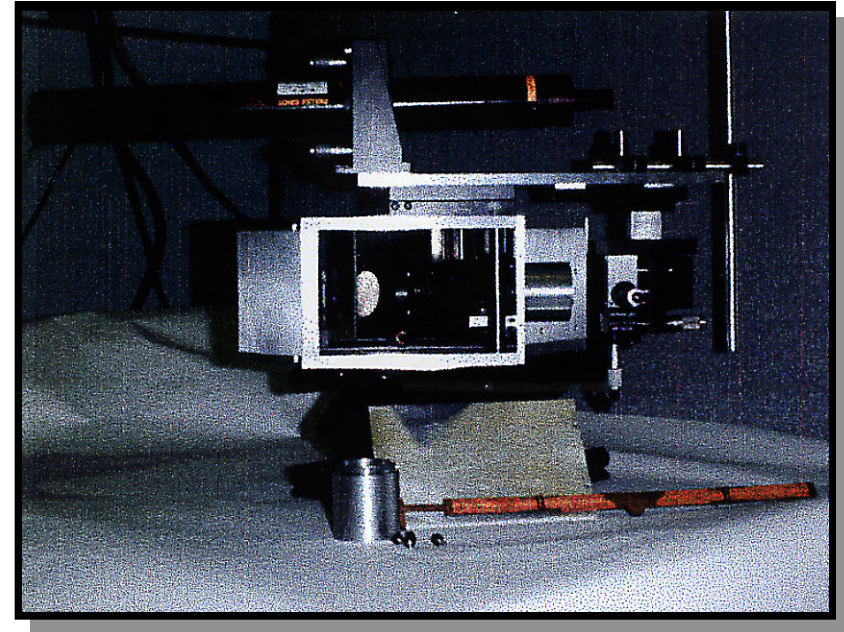
DCATT SCHEMATIC

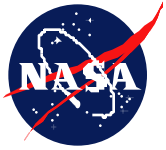


NGST Summer Student Project



- **FLAVIA RODOTA (DAUGHTER OF ESA DIRECTOR GENERAL, A. RODOTA) AND PAOLO ROMANICI SPENT 10 WEEKS ON NGST THIS SUMMER**
 - **MECHANICAL/AEROSPACE ENGINEERING COLLEGE STUDENTS**
 - **THEY DESIGNED AND PACKAGED A SHACK-HARTMANN WAVEFRONT SENSOR**
 - **DESIGN WILL BE ADOPTED FOR DCATT**
 - **TOOK SELF-TAUGHT COURSES IN OPTOMECHANICS AND BASIC AUTOCAD DESIGN**
- **MR. ROMANICI WILL RETURN IN THE SPRING AT THE END OF HIS STUDIES TO CONTINUE WORKING ON NGST, SUPPORTING THE ISIS FLIGHT TEAM**
- **MS. RODOTA EXPRESSED SIMILAR INTEREST IN RETURNING AT THE END OF HER STUDIES IN 2 YEARS**

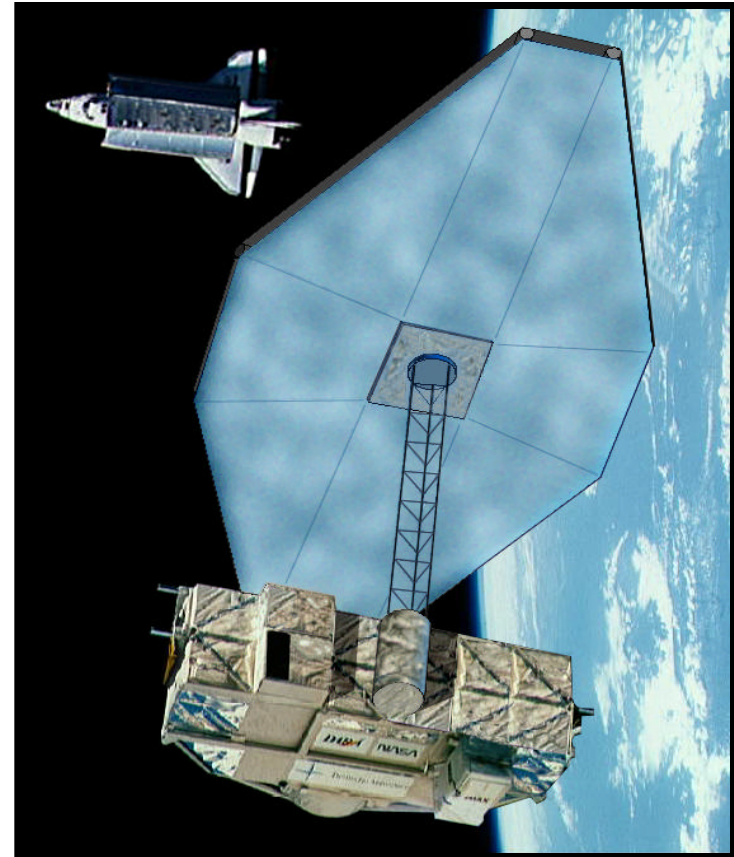




Inflatable Sunshield in Space (ISIS)



- **ISIS (A.K.A. PATHFINDER 1) IS AN NGST \$4M STRETCH TECHNOLOGY FLIGHT VALIDATION OF AN INFLATABLE, 4-LAYER 1/5 SCALE SUNSHIELD IN ZERO-G**
 - **MISSION STS-108 MANAGED BY LINDA PACINI (GSFC, STAAC)**
 - **LAUNCH DATE OF JUNE, 2000**
 - **ASTROSPAS VEHICLE LIKELY TO BE PROVIDED BY DLR ASSUMING ESA FUNDING COMES THROUGH**
- **GSFC/PACINI HAS SUCCESSFULLY PARTNERED WITH JPL AND DLR**
 - **4 GSFC C.S. FTEs CURRENTLY ON FLIGHT TEAM - INCREASED STAFFING SOON**
 - **AWAITING FINAL DISPOSITION OF SPAS MOA**
 - **JPL DEVELOPING TECHNOLOGY ASPECTS OF THE INFLATABLE PAYLOAD ON CODE SM INFLATABLES PROGRAM FUNDS**
 - **NGST WILL PROCURE THE FLIGHT ARTICLE**





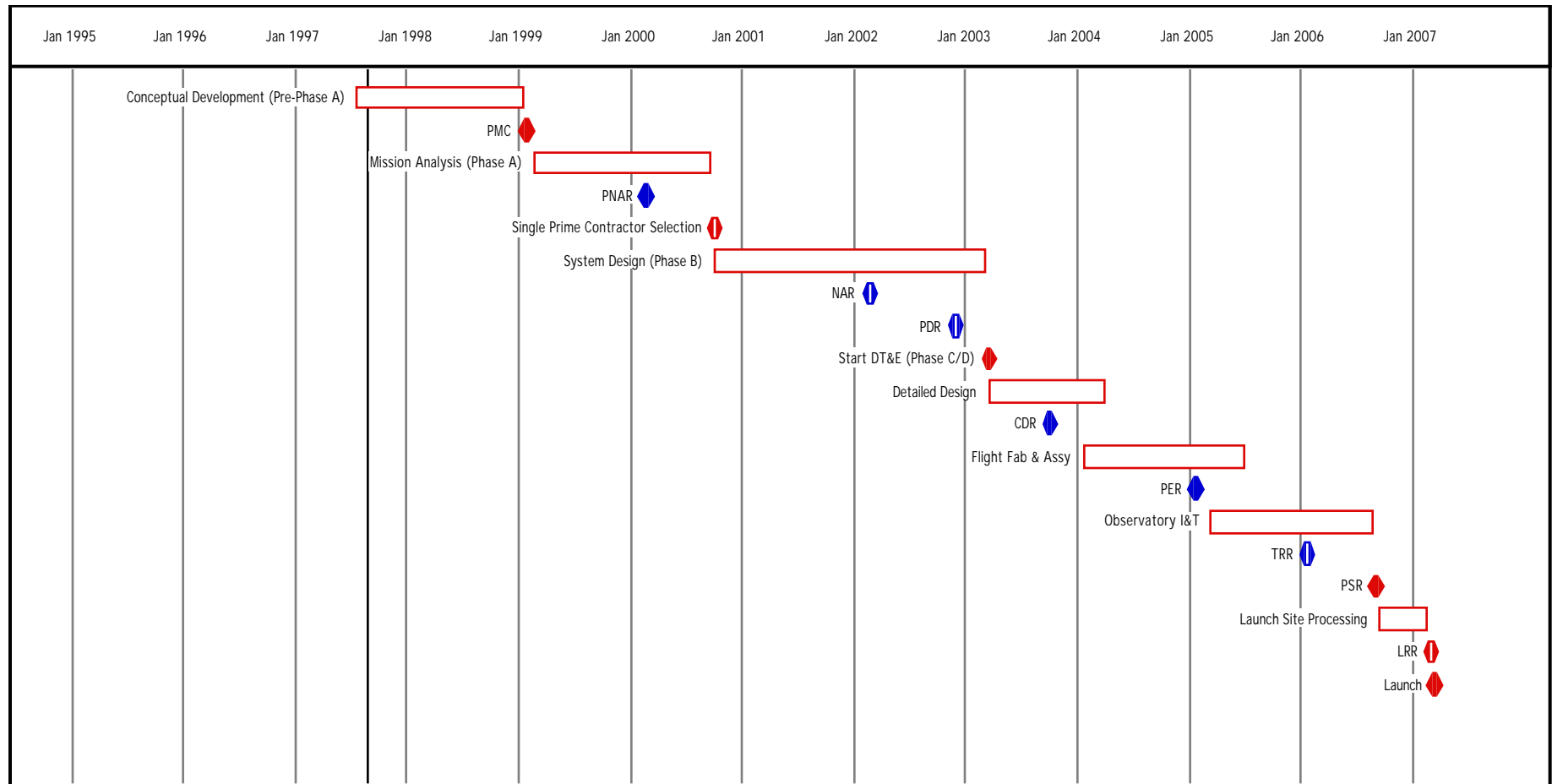
Upcoming Events



- INTEGRATED MISSION DESIGN CENTER (IMDC) ACTIVITIES ON ISIS AND NEXUS SCHEDULED FOR NOVEMBER
- PUBLICATION OF THE NGST APPLIED SCIENCE BOOK FROM THE APRIL '97 "SCIENCE WITH THE NGST" MEETING
 - STOCKMAN SAYS TO LOOK FORWARD TO A BETTER PRODUCT THAN THE CORRESPONDING HST AND AXAF DOCUMENTS
 - *"EXCITING SCIENCE AND AMBITIOUS FOR THIS STAGE OF THE PROJECT"*
- PIERO MADAU (ST SCI) IS WORKING ON AN "NGST CENSUS;" IE., HOW MANY AND WHAT KIND OF ASTRONOMICAL OBJECTS WILL WE SEE IN A FULL 4 ARCMINUTE SQUARE FIELD
- JOHN MATHER AND PIERRE BELY WILL BE PUBLISHING A SERIES OF QUANTIFIABLE METRICS FOR THE NGST SCIENCE AND TECHNOLOGY DEVELOPMENT EFFORTS, RESPECTIVELY
- SCIENCE EXPERT ASSISTANT (SEA) WORKSHOP TO BE HELD AT GSFC ON 11/3
- DEC 5 ORIGINS PUBLIC OUTREACH MEETING AT GSFC
- INTEGRATED MODELING OF OPTICAL SYSTEMS WORKSHOP TO BE HELD IN PASADENA JAN 19-21, 1998. HOSTED JOINTLY BY JPL AND GSFC/NGST



NGST Development Schedule



GODDARD SPACE FLIGHT CENTER

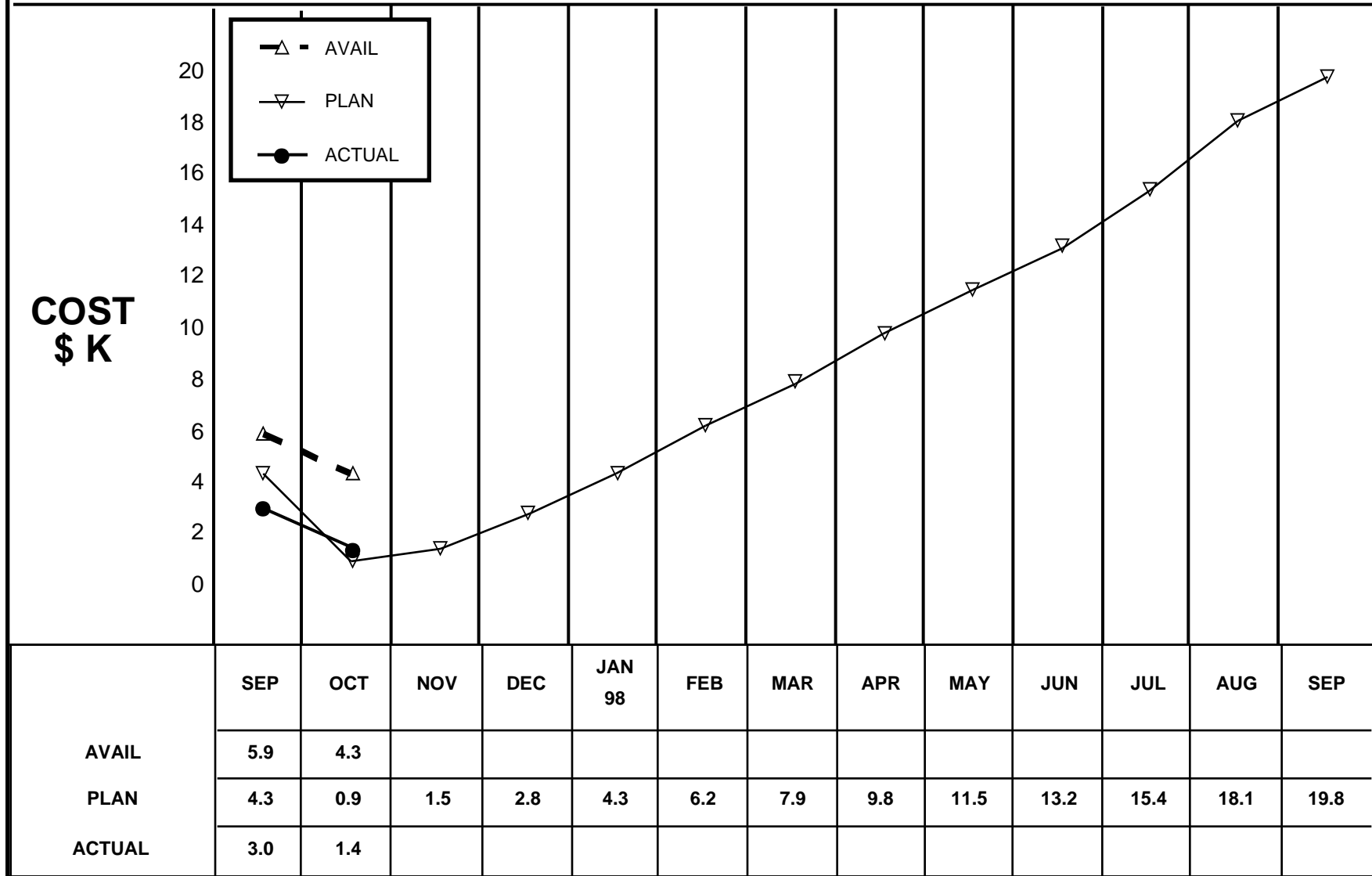
APPROVAL: B. SEERY

ACCOMPLISHMENT: G. GOODMAN

NEXT GENERATION SPACE TELESCOPE **POP 97-1** **TOTAL**

COST

STATUS AS OF:10/31/97



FY 98

NEXT GENERATION SPACE TELESCOPE

AS OF: 10/31/97

| ELEMENT | COST (\$M) | | | EXPLANATION AND PROGRAMMATIC IMPACT |
|---------|-------------|--------|------|---|
| | CUM PLAN | ACTUAL | Δ | |
| NGST | 0.9 | 1.4 | 0.50 | \$.5 - Architecture Studies - Completion of Studies end of September |



NGST Issues / Actions



| PROBLEM/ISSUES | PROGRAMMATIC IMPACT | ACTION | STATUS |
|--|--|--|--|
| Kodak pulled out of NMSD COI Team | <ul style="list-style-type: none"> COI recovered rapidly and signed HDOS and Water Jet Technologies | <ul style="list-style-type: none"> Seery/Bilbro will meet with Kodak Gov't Systems VP on Nov. 25 in Rochester | <ul style="list-style-type: none"> No Impact - Good PDR |
| 1998-99 Budget | <ul style="list-style-type: none"> Shortfall of \$11m in 1999 | <ul style="list-style-type: none"> Carry-forward of \$3m of '98 funds into 1999 MOA with NRO to co-invest \$2.5m in advanced mirror procurement in 1999 Draft White paper on Nexus collaboration with NRO | <ul style="list-style-type: none"> Put 'n' take deal with R. Weiss of Explorers Project pending In work; draft MOA delivered 10/28 White Paper delivered 10/28; Joint Working Group meeting on Nov 21 in Chantilly (NRO-NASA-AFRL, NRL) |
| Lead Optical Engineer at MSFC | <ul style="list-style-type: none"> Lack of senior optical engineering oversight impeding progress at MSFC | <ul style="list-style-type: none"> Seery met with Wayne Littles and Carolyn Griner to discuss urgency of a new hire in the Optics & RF Division to support NGST | <ul style="list-style-type: none"> They said they would revisit the hiring plan priorities at MSFC and try to accomodate the need |



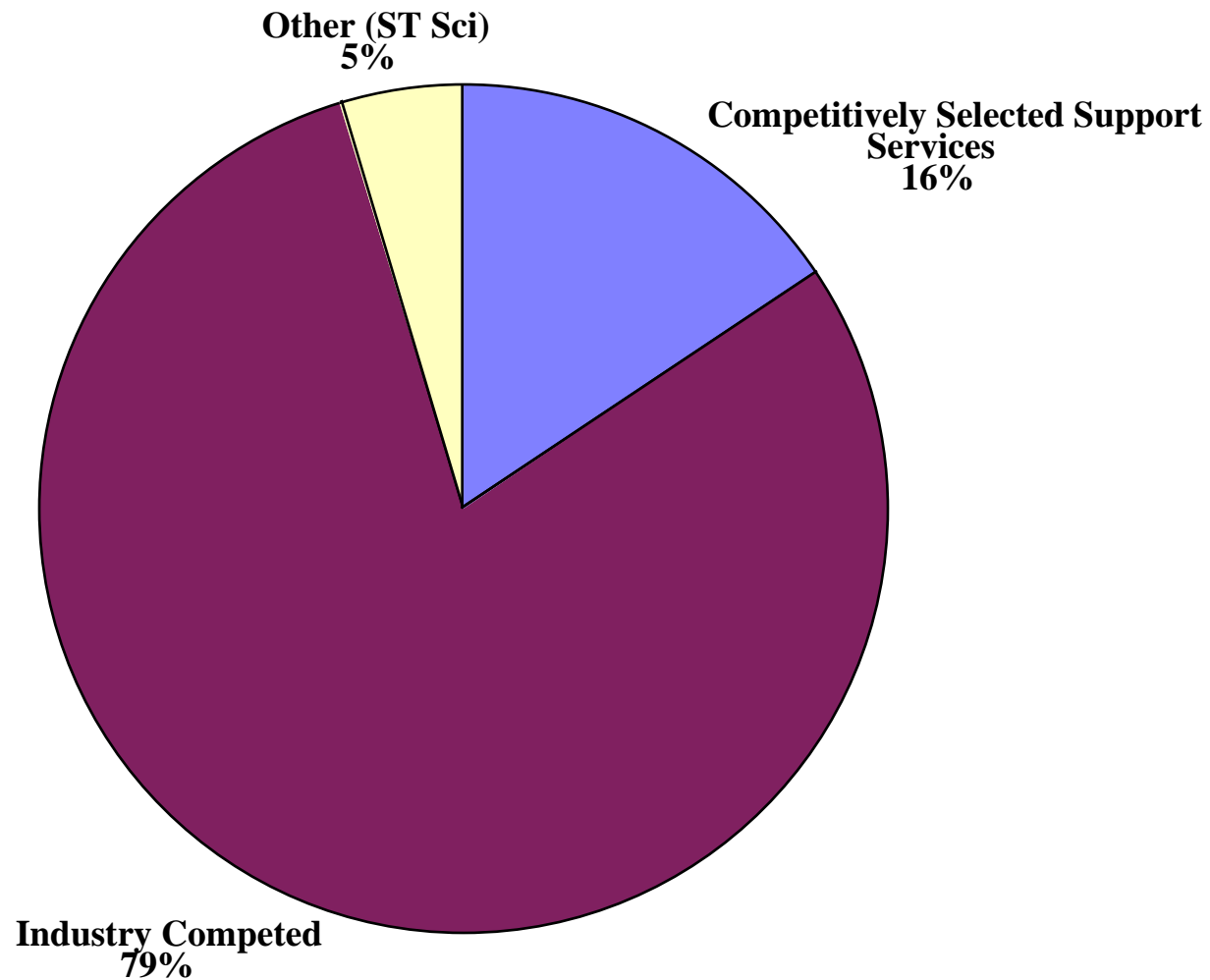
NGST Issues / Actions (Cont'd)



| PROBLEM/ISSUES | PROGRAMMATIC IMPACT | ACTION | STATUS |
|--|--|---|---|
| New ATD Legislation | <ul style="list-style-type: none">75% of all ATD funds must be competed | <ul style="list-style-type: none">FY 98 budget audit completed and initial funding of \$2.8m received | <ul style="list-style-type: none">NGST fully compliantAgency-wide action may delay release of remainder of FY 98 funds |
| Inter-Center personnel work assignments | <ul style="list-style-type: none">L. Pacini has been invited by C. Elachi to spend the month of January at JPL in collaboration with the inflatable technology group working the technology for ISIS | <ul style="list-style-type: none">\$6k of NGST travel funds baselined | <ul style="list-style-type: none">Resolution of NGST travel budget pending |

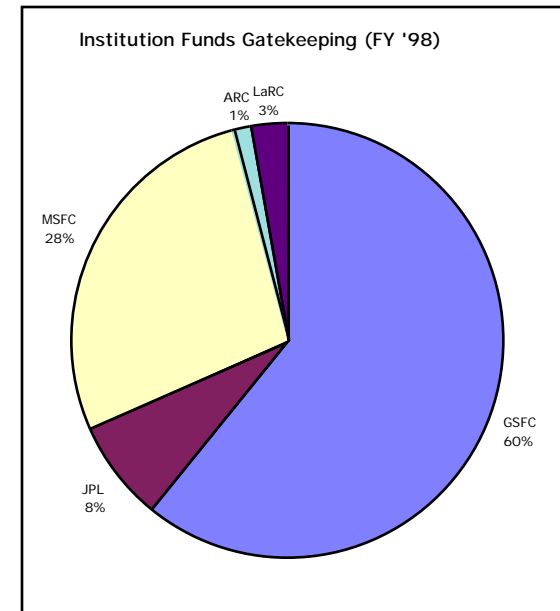
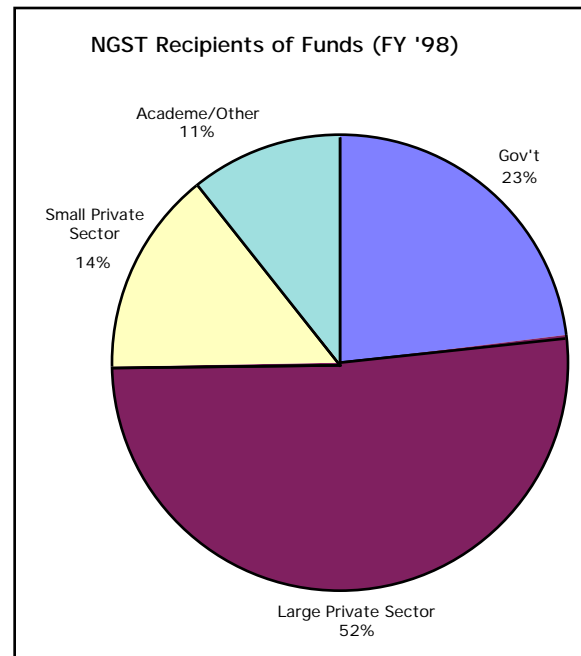
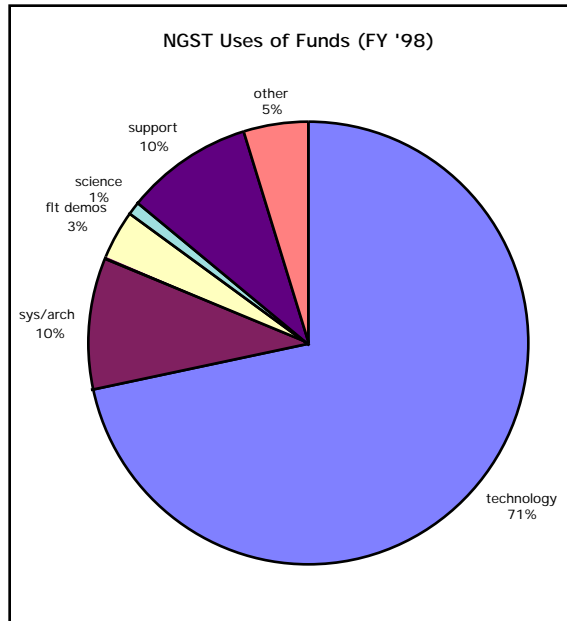


**NGST is fully compliant with the recent
Legislation which dictates that 75% of the
Agency's ATD be openly competed**





NGST Budget Charts





NGST Scientist's Expert Assistant (SEA)



- **GSFC-LED, HANDS-ON DEVELOPMENT TEAMING CIVIL SERVANTS WITH ST Sci AND SUPPORT SERVICES CONTRACTORS**
- **TECHNOLOGY ENDEAVOR COMBINING WEB-ACCESSED GRAPHICAL TOOLS, RULE-BASED EXPERT SYSTEMS AND ON-LINE DOCUMENTATION**
 - **OBJECTIVE IS MARKED REDUCTION IN NUMBER OF OPERATIONS PERSONNEL NEEDED TO SUPPORT SCIENCE PROPOSAL CREATION BY USER COMMUNITY**
- **PROOF-OF-CONCEPT PROTOTYPE DEVELOPMENT UNDERWAY FOR HST'S ADVANCED CAMERA FOR SURVEYS (ACS)**
 - **OBJECTIVE IS FIELD-TESTING BY A REPRESENTATIVE GROUP OF ASTRONOMERS IN A REAL-LIFE APPLICATION**
 - **LESSONS LEARNED WILL IMPROVE ROADMAP FOR APPLICATION TO NGST**
 - **HELPS TO CREATE USER-ACCEPTANCE OF NGST OPERATIONS STAFFING OBJECTIVES**



Recent Progress (cont'd)



- **SEA DEVELOPMENT IS LED BY INFORMATION SYSTEMS CENTER (CODE 588) AND SUPPORTED BY NGST TECHNOLOGY FUNDS**
 - **APPROXIMATELY 4 FTE'S THROUGH CALENDAR 1999**
- **CONCEPT DEFINITION, PRELIMINARY PLANNING AND INITIAL TOOL SELECTION WILL BE COMPLETED IN NOVEMBER**
 - **REQUIREMENTS DOCUMENT AND RELEASE PLAN AVAILABLE JANUARY '98**
 - **PHASE II (FY 98) INCLUDES INITIAL BUILD OF PRINCIPLE SEA COMPONENTS**
 - **PHASE III (FY 99) PRODUCES AND DEPLOYS ACS PROTOTYPE**
 - **PHASE IV (FY 00) EVALUATES METRICS AND LESSONS LEARNED**